CLAIMS:

1. A system for visualizing a three-dimensional (hereinafter "3D") volume, in particular for medical applications; the system including:

an input for receiving a three-dimensional set of data representing voxel values of the 3D volume;

a storage for storing the data set;

an output for providing pixel values of a two-dimensional (hereinafter "2D") image for rendering; and

a processor for, under control of a computer program, processing the data set to obtain a 2-dimensional representation of the volume by projecting the volume onto an imaginary 2D projection screen from a predetermined viewpoint by for each pixel of the 2D projection image:

- casting a ray from the viewpoint through the pixel and through the volume;

- traversing along the ray through at least a plurality of ray positions within the volume under control of a protocol that determines a rendering algorithm and/or rendering parameters in dependence on the ray position; and

- for each of the plurality of ray positions using the determined rendering algorithm/parameters to calculate a contribution to a pixel value of the pixel based on at least one voxel value within a predetermined range of the ray position.

2. A system as claimed in claim 1, wherein the protocol is based on a-priori knowledge of at least one of the following: the volume, the medical situation, the clinical situation.

3. A system as claimed in claim 1 or 2, wherein the a-priori knowledge is derived from a 3D model of at least one object in the volume.

4. A system as claimed in any one of the preceding claims wherein the protocol is rule-based.

5. A system as claimed in claim 4, wherein a rule prescribes for each of the plurality of ray positions at least one processing action at least in dependence on processing results of ray position along the ray that already been processed.

6. A system as claimed in claim 5, wherein the processing action includes at least one of the following:

- jumping forward or backward along a ray to a particular ray position, and resuming processing from that position;
- switching a stepping direction along a ray between forward and backward as seen from the viewpoint;
- changing a step size that determines a next ray position with respect to a current ray position in the stepping direction;
- changing a 3-dimensional direction of a ray starting from a particular position;
- switching to another rendering algorithm;
- adapting rendering parameters for controlling the rendering algorithm;
- switching to another feature detection method, which determines the type of information that is going to be visualized by the rendering algorithm.

7. A system as claimed in any one of the preceding claims, wherein a storage of the system includes a plurality of protocols for controlling the traversing along the ray.

8. A system as claimed in claims 2 and 7, wherein the storage includes respective predetermined protocols for a plurality of distinct types of volumes.

9. A system as claimed in claim 2 and 7, wherein the storage includes for at least one type of volume a plurality of predetermined protocols.

10. A system as claimed in claim 7, 8 or 9, wherein the computer program is operative to cause the processor to enable a human operator to select at least one protocol from the plurality of stored protocols for processing the volume.

11. A system as claimed in claim 10, wherein the computer program is operative to cause the processor to store a selection of a human operator in association with an identity of the operator for subsequent retrieval.

12. A system as claimed in any one of the preceding claims, wherein the computer program is operative to cause the processor to enable a human operator to define and/or adapt a protocol for processing the volume.

13. A computer program product for causing a processor to process a three-dimensional set of data representing voxel values of a 3D volume to obtain a 2-dimensional representation of the volume by projecting the volume onto an imaginary 2D projection screen from a predetermined viewpoint by for each pixel of the 2D projection image:

casting a ray from the viewpoint through the pixel and through the volume;

traversing along the ray through at least a plurality of ray positions within the volume under control of a protocol that determines a rendering algorithm and/or rendering parameters in dependence on the ray position; and

for each of the plurality of ray positions using the determined rendering algorithm to calculate a contribution to a pixel value of the pixel based on at least one voxel value within a predetermined range of the ray position.

14. A method of visualizing a 3D volume by processing a three-dimensional set of data representing voxel values of the 3D volume to obtain a 2-dimensional representation of the volume by projecting the volume onto an imaginary 2D projection screen from a predetermined viewpoint by for each pixel of the 2D projection image:

casting a ray from the viewpoint through the pixel and through the volume;

traversing along the ray through at least a plurality of ray positions within the volume under control of a protocol that determines a rendering algorithm and/or rendering parameters in dependence on the ray position; and

for each of the plurality of ray positions using the determined rendering algorithm to calculate a contribution to a pixel value.